

## CLAIMS

1. A mobile device, comprising:
  - a keypad of number keys, the number keys having associated letters;
  - a language system to receive an input string entered via the keypad that is representative of one or more phonetic characters and generate likely language characters based on the input string;
  - a display to present the likely language characters for user selection; and
  - the language system being configured to facilitate input of the input string and selection of a language character without switching modes between input and selection.
2. A mobile device as recited in claim 1, wherein the phonetic characters are Chinese Pinyin and the language characters are Chinese Hanzi.
3. A mobile device as recited in claim 1, wherein the likely language characters are presented on the display in an index that associates selection keys of the keypad with the language characters so that user entry of a selection key results in a selection of a corresponding language character and user entry of a non-selection key results in further input.

1           4.     A mobile device as recited in claim 1, wherein the likely language  
2 characters are presented on the display in an index that associates selection keys of  
3 the keypad with the language characters, the selection keys being selected based  
4 on whether the letters associated therewith follow the phonetic characters already  
5 entered.

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7           5.     A mobile device as recited in claim 1, wherein the language system  
8 includes an association module that automatically presents the language characters  
9 as the user depresses individual keys.

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11           6.     A mobile device as recited in claim 1, wherein the language system  
12 includes a sentence-based search engine to derive the language characters based  
13 on context of the input string within one or more words of a common sentence.

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15           7.     A mobile device as recited in claim 1, wherein the language system  
16 includes a language model to statistically derive the language characters.

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18           8.     A mobile device as recited in claim 1, wherein the language system  
19 includes a character-based bigram language model and a word-based N-gram  
20 language model, where  $N > 2$ .

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22           9.     A mobile device as recited in claim 1, wherein the language system  
23 converts the phonetic characters to the language characters.

1           **10.**    A mobile device as recited in claim 1, wherein the language system  
2 includes a direct key-based search engine that generates the language characters  
3 based on a key sequence entered on the keypad in lieu of converting the phonetic  
4 characters to the language characters.

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6           **11.**    A mobile device as recited in claim 1, wherein the language system  
7 includes.

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9           **12.**    A mobile device as recited in claim 1, wherein the language system  
10 includes a first name model to detect first names in the input string.

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12           **13.**    A mobile device as recited in claim 1, wherein the language system  
13 comprises:

14               a first name model to detect first names in the input string;

15               a surname model to detect surnames in the input string; and

16               a character-based bigram language model.

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18           **14.**    A mobile device as recited in claim 1, wherein the language system  
19 comprises:

20               a resident language model residing on the mobile device to statistically  
21 derive the language characters using a first statistical language model; and

22               a nonresident language model residing on a remote server,  
23 communicatively coupled to the mobile device, to statistically derive the language  
24 characters using a second statistical language model.

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2       **15.**   A mobile device as recited in claim 1, further comprising a scroll  
3 control key to present other likely language characters.

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5       **16.**   A mobile device as recited in claim 1, embodied as a mobile phone.

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7       **17.**   A mobile device, comprising:  
8       a keypad of number keys, the number keys having associated letters of an  
9 alphabet; and  
10       a direct key-based search engine that generates possible language  
11 characters that are not part of the alphabet based on a key sequence entered on the  
12 keypad.

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14       **18.**   A mobile device as recited in claim 17, wherein the alphabet is an  
15 English alphabet and the language characters are Chinese Hanzi.

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17       **19.**   A mobile device as recited in claim 17, further comprising an  
18 association module that automatically presents the language characters as the user  
19 depresses individual keys.

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21       **20.**   A mobile device as recited in claim 17, embodied as a mobile  
22 phone.

1           **21.**     A mobile device, comprising:  
2           a keypad of number keys, the number keys having associated letters of an  
3           alphabet;  
4           an association module that associates a key sequence with language  
5           characters that are not part of the alphabet; and  
6           a display to present the possible language characters as the user depresses  
7           individual keys based on the key sequence.

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9           **22.**     A mobile device as recited in claim 21, wherein the alphabet is an  
10          English alphabet and the language characters are Chinese Hanzi.

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12          **23.**     A mobile device as recited in claim 21, embodied as a mobile  
13          phone.

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15          **24.**     A mobile device, comprising:  
16          a keypad of number keys, the number keys having associated letters of an  
17          alphabet;  
18          a language system to receive an input string entered via the keypad that is  
19          representative of one or more phonetic characters and convert the phonetic  
20          characters to language characters that are not part of the alphabet using a statistical  
21          language model that utilizes at least one neighboring word in a common sentence;  
22          and  
23          a display to present the language characters for user selection.

1           **25.**    A mobile device as recited in claim 24, wherein the alphabet is an  
2 English alphabet and the language characters are Chinese Hanzi.

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4           **26.**    A mobile device as recited in claim 24, embodied as a mobile  
5 phone.

6  
7           **27.**    A system comprising:  
8           a resident language model residing on a mobile device to convert phonetic  
9 characters input into the mobile device into language characters using a first  
10 statistical language model; and

11           a nonresident language model residing on a server remote from the mobile  
12 device, the nonresident language model being configured to convert the phonetic  
13 characters into the language characters using a second statistical language model.

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15           **28.**    A system as recited in claim 27, wherein the first statistical language  
16 model is a character-based bigram language model and the second statistical  
17 language model is a word-based N-gram language model, where  $N > 2$ .

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19           **29.**    A method comprising:  
20           receiving an input string entered via a keypad;  
21           presenting likely language characters based on the input string; and  
22           facilitating continued entry of the input string and selection of a suitable  
23 language character without switching modes between input and selection.  
24  
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1           **30.**    A method as recited in claim 29, wherein the language characters are  
2 Chinese Hanzi.

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4           **31.**    A method as recited in claim 29, further comprising indexing the  
5 likely characters when presented in a manner that associates certain keys of the  
6 keypad with the language characters so that user entry of a certain key results in a  
7 selection and user entry of a non-certain key results in further input.

8  
9           **32.**    A method as recited in claim 29, further comprising:  
10 associating key entries with the language characters; and  
11 presenting the likely language characters intended by the user as the user  
12 depresses individual keys.

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14           **33.**    A method as recited in claim 29, further comprising deriving the  
15 language characters using a context-based statistical language model.

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17           **34.**    A method as recited in claim 29, further comprising detecting  
18 surnames in the input string.

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20           **35.**    A method as recited in claim 29, further comprising detecting first  
21 names in the input string.

1           **36.**    A computer-readable medium storing computer-executable  
2 instructions that, when executed on a processor, perform the method as recited in  
3 claim 29.

4  
5           **37.**    One or more computer-readable media having stored thereon a  
6 plurality of instructions that, when executed by one or more processors of a  
7 computer, causes the one or more processors to perform acts including:

8                receiving an input string entered via a numeric-based keypad where number  
9 keys in the keypad have associated letters in an alphabet, the input string being  
10 representative of one or more phonetic characters;

11               converting the input string of phonetic characters to possible language  
12 characters that are not part of the alphabet; and

13               presenting the language characters using an index that associates selection  
14 keys of the keypad with the language characters, the selection keys being chosen  
15 based on whether the letters associated with the selection keys are likely to follow  
16 the phonetic characters already entered.

17  
18           **38.**    One or more computer-readable media as recited in claim 37,  
19 wherein the phonetic characters are Chinese Pinyin and the language characters  
20 are Chinese Hanzi.



1           **39.** One or more computer-readable media as recited in claim 37,  
2 wherein the plurality of instructions further cause the one or more processors to  
3 perform acts including selecting one of the selection keys to selection one of the  
4 language characters.

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6           **40.** One or more computer-readable media as recited in claim 37,  
7 wherein the plurality of instructions further cause the one or more processors to  
8 perform acts including selecting a key that is not a selection key to continue the  
9 input string.

10  
11           **41.** One or more computer-readable media as recited in claim 37,  
12 wherein the plurality of instructions further cause the one or more processors to  
13 perform acts including:

14           associating key entries with the language characters; and

15           presenting the likely language characters intended by the user as the user  
16 depresses individual keys.

17  
18           **42.** One or more computer-readable media as recited in claim 37,  
19 wherein the plurality of instructions further cause the one or more processors to  
20 perform acts including deriving the language characters using a context-based  
21 statistical language model.

1       **43.** One or more computer-readable media as recited in claim 37,  
2 wherein the plurality of instructions further cause the one or more processors to  
3 perform acts including detecting surnames in the input string.

4  
5       **44.** One or more computer-readable media as recited in claim 37,  
6 wherein the plurality of instructions further cause the one or more processors to  
7 perform acts including detecting first names in the input string.

8  
9       **45.** A method comprising:  
10       facilitating entry of phonetic characters via discrete keys of a keypad; and  
11       generating possible language characters intended by the user based on a key  
12       sequence entered on the keypad in lieu of converting the phonetic characters to the  
13       language characters.

14  
15       **46.** A computer-readable medium storing computer-executable  
16 instructions that, when executed on a processor, perform the method as recited in  
17 claim 45.

18  
19       **47.** A method comprising:  
20       receiving key entries entered via a numeric-based keypad where number  
21       keys in the keypad have associated letters;  
22       associating strings of key entries with language characters that are different  
23       than the letters; and  
24       presenting likely language characters intended by the user as the user  
25       depresses individual keys.

1  
2       **48.**   A computer-readable medium storing computer-executable  
3 instructions that, when executed on a processor, perform the method as recited in  
4 claim 47.

5  
6       **49.**   A method comprising:  
7       receiving an input string entered via a numeric-based keypad where number  
8 keys in the keypad have associated letters, the input string being representative of  
9 one or more phonetic characters;  
10       converting the input string of phonetic characters to possible language  
11 characters based upon a context of at least one word in a sentence within which  
12 the input string is a part; and  
13       presenting the possible language characters for selection by the user.

14  
15       **50.**   A computer-readable medium storing computer-executable  
16 instructions that, when executed on a processor, perform the method as recited in  
17 claim 49.

18  
19       **51.**   A method comprising:  
20       receiving an input string entered via a keypad on a mobile device;  
21       sending the input string to a remote server;  
22       generating likely language characters based on the input string at the  
23 remote server; and  
24       returning the likely language characters to the mobile device for display.  
25